

# PATENT ABSTRACTS OF JAPAN

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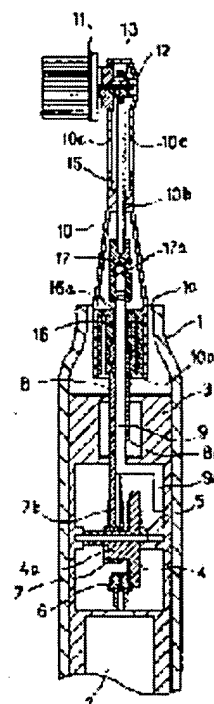
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## (54) ELECTRIC TOOTHBRUSH

(57)Abstract:

**PURPOSE:** To provide an electric toothbrush having excellent brushing effect in a simple constitution and at a low cost by giving reciprocatory motion to an attachment having a brush body, and giving rotary motion to the brush body provided at the attachment itself simultaneously.

**CONSTITUTION:** A drive shaft 8 is supported in a case 1 to be freely movable axially, it is composed in such a way that rotation of a drive motor 2 provided inside the case 1 is converted by a first motion converting mechanism 4a, 7 into reciprocatory motion to be transmitted to the drive shaft 8, a brush body 11 is freely rotatably provided at a forward end of an attachment 10 connected to this drive shaft 8, and reciprocatory motion of the attachment 10 in the axial direction is converted by a second motion converting mechanism 13 into rotary motion to be transmitted to the rotary brush 11.



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CLAIMS

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[Claim(s)]

[Claim 1] The drive motor formed in the interior of a case, and the driving shaft currently supported free [ migration to shaft orientations ] inside the above-mentioned case, The 1st movement translator which changes rotation of the above-mentioned drive motor into a reciprocating motion, and is transmitted to the above-mentioned driving shaft, The attachment connected with the above-mentioned driving shaft, and the rotation brush object prepared in the point of the above-mentioned attachment free [ rotation ], The electric toothbrush characterized by consisting of the 2nd movement translator which changes the reciprocating motion of the shaft orientations of the above-mentioned attachment into rotation, and is transmitted to the above-mentioned rotation brush object.

[Claim 2] When the attachment concerned is connected with the above-mentioned driving shaft, the extension bar connected with the fixed shaft established fixed inside the above-mentioned case is relatively prepared in the interior of the above-mentioned attachment movable to the above-mentioned attachment. The electric toothbrush according to claim 1 characterized by having prepared the rack which gears with the pinion prepared in the revolving shaft of the above-mentioned rotation brush object in the above-mentioned extension bar, and constituting the movement translator of the above 2nd with the above-mentioned pinion and the above-mentioned rack of the above-mentioned extension bar.

[Claim 3] The above-mentioned fixed shaft is an electric toothbrush according to claim 2 characterized by having penetrated the above-mentioned driving shaft in same axle.

[Claim 4] The electric toothbrush according to claim 3 characterized by wrap covering having prepared the upper limit section of the above-mentioned fixed shaft and the above-mentioned driving shaft in the interior of the above-mentioned attachment.

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to an electric toothbrush.

[0002]

[Description of the Prior Art] About the electric toothbrush, many things are proposed conventionally and a variety of electric toothbrushes are marketed till today. the thing it was made to drive to the longitudinal direction by the motor which has prepared the typical thing free [ migration ] and free [ attachment and detachment ] also in it relatively [ the attachment which has a brush object in the upper limit section / case ], and has been formed in the interior of a case -- or there is a thing it was made to drive the brush object itself instead of an attachment. For example, the electric toothbrush with which it was made for the hair ends of a brush to vibrate finely is indicated by JP,61-55963,B. Moreover, the electric toothbrush which makes the gear-tooth brush attached in the driving shaft reciprocate along the shaft orientations or the direction of an axial right angle is indicated by JP,61-64204,A.

[0003] The electric toothbrush which made adjustable the stroke of reciprocation of the shaft orientations given to a gear-tooth brush is indicated by JP,61-79410,A further again.

[0004]

[Problem(s) to be Solved by the Invention] In what gave a fine vibration to the gear-tooth brush among the above-mentioned Prior arts, when the body of a gear-tooth brush is grasped strongly, this fine vibration is absorbed, and the vibration displacement of a brush object becomes close to zero, and is inferior to the toothbrushing effectiveness. Moreover, in what gave movement to the attachment section (part equivalent to the shank of the usual gear-tooth brush) which has a brush object, the brush object itself has fixed to the attachment and it is immobilization. Moreover, in the thing it was made for the brush object itself to rotate, the part of the attachment which has a brush object serves as immobilization. So, in this invention, it aims at offering cheaply the electric toothbrush which was excellent in the toothbrushing effectiveness with an easy configuration by giving rotation to the brush object itself prepared in this attachment at the same time it gives the reciprocating motion of shaft orientations to the attachment which has a brush object.

[0005]

[Means for Solving the Problem] The driving shaft is supported by this invention free [ migration to shaft orientations ] within a case. Rotation of the drive motor formed in this case is changed into a reciprocating motion by the 1st movement translator, and is transmitted to a driving shaft. The rotation brush object is prepared in the point of the attachment connected with this driving shaft free [ rotation ], and the reciprocating motion of the shaft orientations of an attachment is characterized by what it is changed into rotation by the 2nd movement translator, and is transmitted to a rotation brush object. Moreover, preferably, in the attachment, when the attachment concerned is connected with the above-mentioned driving shaft, the extension bar connected with the above-mentioned fixed shaft is relatively prepared movable to the attachment, the rack which gears with the pinion prepared in the revolving shaft of a rotation brush object to this extension bar is prepared, and the 2nd movement translator is

constituted by this pinion and rack. A fixed shaft penetrates a driving shaft in same axle still more preferably.

[0006]

[Function] The own reciprocating motion of an attachment is changed by the 2nd movement translator, and is transmitted to the rotation brush object in the point of an attachment, and this rotation brush object rotates at the same time rotation of the motor formed in the case is changed by the 1st movement translator, and is transmitted to an attachment through a driving shaft and this attachment reciprocates.

[0007]

[Example] The 1st example of this invention is explained with reference to drawing 1 -4. As shown in drawing 1 and 2, DC motor 2 which makes a driving source the dry cell which is not illustrated is provided in the case 1 bell shape interior which has opening 1a in upper limit through the supporter material 3. The bevel gear 4 is formed in the supporter material 3 free [ rotation ] through the shaft 5. The tooth part of this bevel gear 4 has geared with the motor pinion 6 prepared in DC motor 2.

[0008] Eccentric-cam 4a is formed in the lateral portion of a bevel gear 4 at one, and the cam follower 7 is engaging with this eccentric-cam 4a. The cam follower 7 had opening 7a which has height equal to the diameter of eccentric-cam 4a as shown in drawing 1 , and eccentric-cam 4a has fitted in in this opening 7a. One direction rotation centering on the shaft 5 of a bevel gear 4 is changed into the reciprocating motion of the vertical direction by the cam follower 7 which follows rotation of eccentric-cam 4a. This eccentric-cam 4a and cam follower 7 constitute the 1st movement translator which changes rotation of DC motor 2 into a reciprocating motion. In the center of the upper part of the supporter material 3, the driving shaft 8 which makes the shape of hollow is supported free [ sliding ] in accordance with the shaft orientations (the vertical direction of drawing 1 ). The lower limit section of a driving shaft 8 has connected with arm section 7b of the cam follower 7 upper part, and the reciprocating motion of the vertical direction of a cam follower 7 is transmitted to this driving shaft 8. Inside the hollow of a driving shaft 8, the fixed shaft 9 has penetrated in same axle, the lower limit section of this fixed shaft 9 was crooked in the shape of L character, and is projected from notch 8a of a driving shaft 8, and that protrusion edge 9a has fixed to the wall of the supporter material 3. In addition, it is prevented that the water which invaded from upper limit opening 1a of a case 1 trespasses even upon the case 1 interior in which DC motor 2 and the bevel gear 4 grade are prepared by the supporter material 3. The point of a driving shaft 8 is equipped with the attachment 10 which has opening 10a free [ attachment and detachment ] through the connection adapter 16 mentioned later in the lower limit. Therefore, the both-way drive of this attachment 10 is relatively carried out in the vertical direction to a case 1 at a driving shaft 8 and one. The shaft 12 is formed in the interior of the tip of an attachment 10. The rotation brush object 11 which has two or more brushes is established free [ rotation ] and free [ attachment and detachment ] to the attachment 10 through this shaft 12. On the shaft 12 which is the center of rotation of the rotation brush object 11, the pinion 13 rotated to this rotation brush object 11 and one is supported to revolve. Two or more heights 10b is formed in the interior of an attachment 10. It is supported so that the extension bar 15 can slide freely in accordance with those shaft orientations (the vertical direction of drawing 1 ) by this heights 10b inside an attachment 10. The upper limit section of the extension bar 15 is crooked in the shape of L character, and rack 15a which gears with the tooth part of a pinion 13 to this flection is formed. In addition, weep hole 10c for draining the water which invaded from between an attachment 10 and the rotation brush objects 11 is formed in the peripheral face of an attachment 10. The connection adapter 16 which has through tube 16a in the center is fixed to the lower part of an attachment 10. As shown in drawing 4 , when the lower limit section of through tube 16a of this connection adapter 16 inserts an attachment 10 in upper limit opening 1a of a case 1, it connects with the upper limit section of a driving shaft 8. Therefore, the both-way drive of the attachment 10 is relatively carried out in the vertical direction to a case 1 at a driving shaft 8 and one. In addition, when a driving shaft 8 is equipped with the connection adapter 16 in this way, the upper limit section of the fixed shaft 9 which penetrates a driving shaft 8 carries out the penetration protrusion of the through tube 16a of the connection adapter 16, and advances inside an attachment 10. In the lower limit section of the extension bar 15, the connection coupler 17 which has opening 17a in the lower limit is

fixed. Opening 17a of this connection coupler 17 connects with the upper limit section of the fixed shaft 9, when a driving shaft 8 is equipped with the connection adapter 16 of an attachment 10. Therefore, although an attachment 10 exercises in the vertical direction to a case 1 united with a driving shaft 8, the extension bar 15 connected with the fixed shaft 9 is to a case 1 in the immovable state. For this reason, as shown in drawing 3, the pinion 13 which gears to rack 15a of the extension bar 15 upper-limit section carries out both-way rotation with vertical motion of an attachment 10 at the circumference of a shaft 12. Rotation of this pinion 13 is directly transmitted to the rotation brush object 11, and the rotation brush object 11 carries out both-way rotation on an attachment 10. Thus, a pinion 13 and rack 15a constitute the 2nd movement translator which changes the reciprocating motion of the vertical direction (shaft orientations) of an attachment 10 into rotation. Actuation is explained below. The peripheral face of a case 1 is grasped, and if the switch which does not illustrate is turned ON, DC motor 2 will rotate. Rotation of DC motor 2 is changed into the reciprocating motion of the longitudinal direction of a case 1 through the motor pinion 6 and a bevel gear 4 by eccentric-cam 4a and the cam follower 7 which are the 1st movement translator, it is transmitted to a driving shaft 8, and this driving shaft 8 and the attachment 10 of one reciprocate in the vertical direction to a case 1. If an attachment 10 exercises in the vertical direction, the pinion 13 which gears to rack 15a of the extension bar 15 upper-limit section connected with the fixed shaft 9 fixed to the case 1 will carry out both-way rotation at the circumference of a shaft 12 (refer to drawing 3), and the rotation brush object 11 will carry out both-way rotation by the point of an attachment 10. In addition, although eccentric-cam 4a and a cam follower 7 constitute the 1st movement translator which changes rotation of DC motor 2 into a reciprocating motion from this example, it is not limited to this and various approaches, such as a link mechanism and a slider style, can be considered. Moreover, although a pinion 13 and rack 15a constitute the 2nd movement translator which changes the reciprocating motion of the vertical direction (shaft orientations) of an attachment 10 into rotation, it is not limited to this and various approaches, such as a link mechanism and a slider style, can be considered. Below, the 2nd example of this invention is explained with reference to drawing 5. As shown in drawing 4, it is possible that the water which invaded from between an attachment 10 and the rotation brush objects 11 invades between a driving shaft 8 and the fixed shaft 9, and arrives even at the case 1 interior with the 1st example. In the case 1 interior, he has contained a drive motor 2 and components, such as a dry cell which is not illustrated, and the actual condition does not want to soak these components in water. Then, as the 2nd example shows to drawing 5, it is an attachment about the wrap covering 21 in the upper limit section of a driving shaft 8 and the fixed shaft 9. It has prepared in the interior of 10. Through tube 21b to which the extension bar 15 penetrates the bell shape to which this covering 21 has opening 21a in a lower limit in nothing and the upper part is prepared. Flange section 21c which engages with 10d of engagement heights of the attachment 10 interior is prepared in the lower limit section periphery of covering 21. Moreover, heights 20b currently projected and formed in the top face of the connection adapter 20 is engaging with the hollow internal surface of covering 21. As for the inner skin of heights 20b of the connection adapter 20, the lower part of the connection coupler 17 is inserting the same field as through tube 20a in nothing and this field. Here, since the outer diameter of the connection coupler 17 and the path (bore) of the best inside inside the hollow of covering 21 are formed equally, it is prevented that the water which invaded from between an attachment 10 and the rotation brush objects 11 passes through tube 21b, and trespasses upon the interior of covering 21. Thus, if the upper limit section of a driving shaft 8 and the fixed shaft 9 is covered with covering 21, it can prevent the water which trespassed upon the attachment 10 interior being dammed up by covering 21, and trespassing even upon the case 1 interior through between a driving shaft 8 and the fixed shafts 9.

[0009]

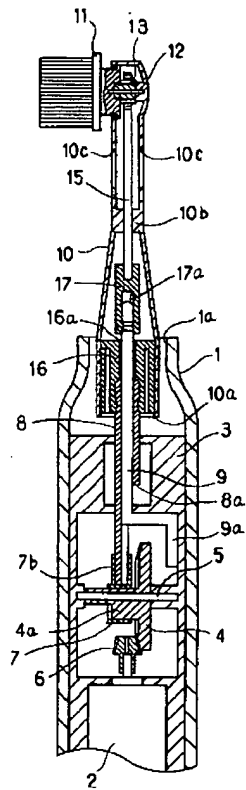
[Effect of the Invention] Since rotation can be given to the brush object itself prepared in this attachment while giving a reciprocating motion to the attachment which has a brush object according to the electric toothbrush of this invention, as explained above, the electric toothbrush which was excellent in the toothbrushing effectiveness can be cheaply offered with an easy configuration. Moreover, if the upper limit section of a driving shaft and a fixed shaft is covered with covering, the water which trespassed

upon the interior of an attachment can prevent water invading even between a driving shaft and a fixed shaft, and it can prevent the components inside a case being damp in water.

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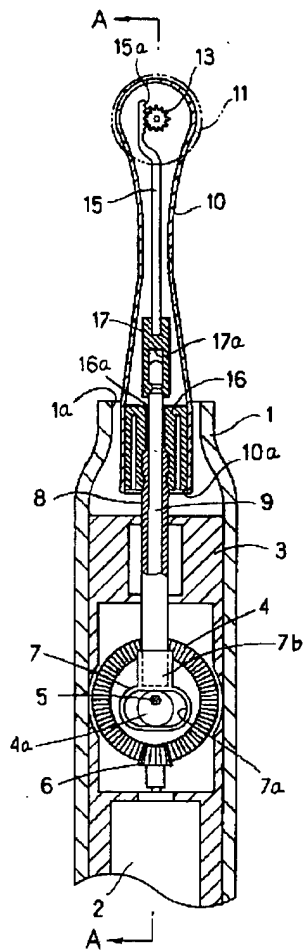
**Drawing selection** Representative drawing



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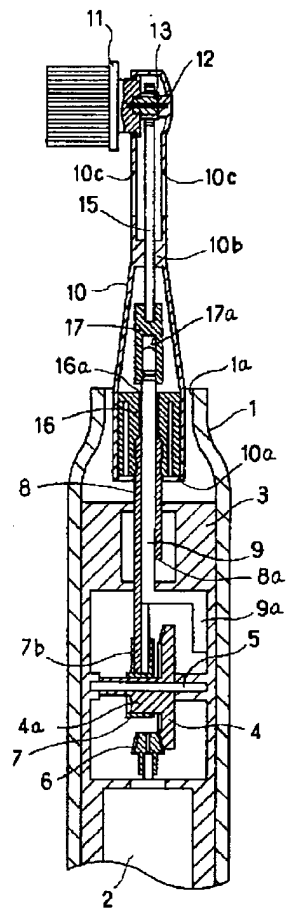


## Drawing selection drawing 1



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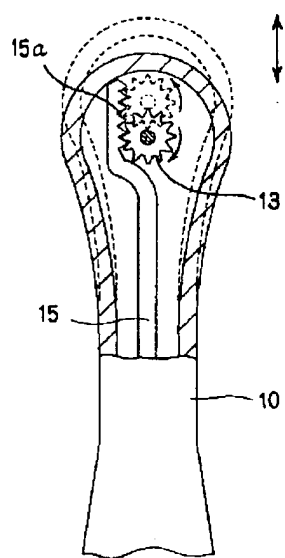
Drawing selection drawing 2



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Drawing selection drawing 3

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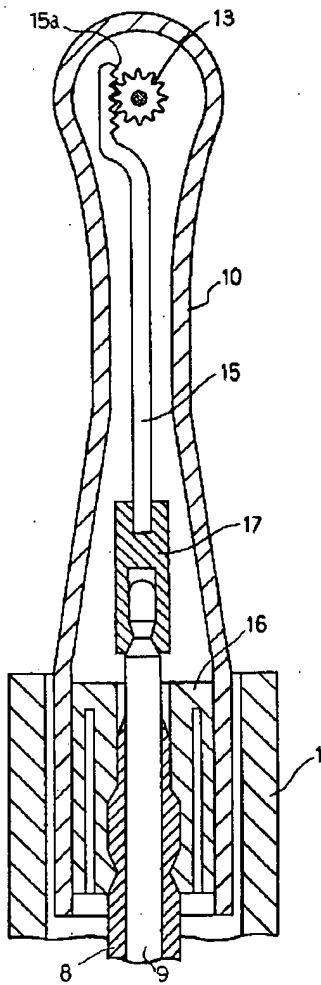


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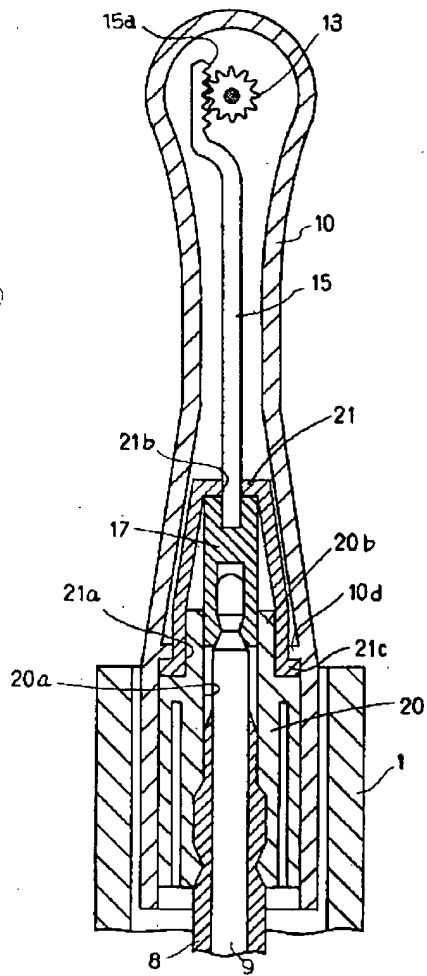
Drawing selection drawing 4

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[Translation done.]

Drawing selection drawing 5



[Translation done.]